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A new species of the genus *Epidamaeus* (Acari, Oribatida, Damaeidae) from China

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Abstract

The oribatid mite genus *Epidamaeus* Bulanova-Zachvatkina, 1957 from China is reviewed, and a list and key to all known species from China are provided. A new species, *Epidamaeus conjungenus* **sp. n.** is identified, and its morphological descriptions and illustrations are also given. The distinct characteristics of *E. conjungenus* **sp. n.** is the coterminous ridge connected to the base of the notogastral setae. Pseudanal setae undulating attenuate, the proximal half with obvious, thorn-like barbs, the distal half smooth.

Keywords

Epidamaeus, new species, checklist, distribution.

Introduction

Oribatid mites of the genus *Epidamaeus* Bulanova-Zachvatkina, 1957 are known to be very diverse throughout the Northern Hemisphere, especially in Europe and North America (Bayartogtokh 2004). Most species of this genus inhabit the litter of forests,

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mosses, decaying woods and organic soil layers, and primarily feed on decomposer or plant pathogenic fungi, therefore, they play an important role in regulation of the density of plant harmful fungi(Bayartogtokh 2000). *Epidamaeus* shows high taxonomic diversity in Europe and some parts of Asia. The genus comprises more than 70 species, that cosmopolitan distributed (Subías 2011). Up to now, only 6 valid species: *E. grandjeani*, *E. cincinnatus*, *E. elegantis*, *E. longispinosus*, *E. yunnanensis*, *E. alticola* from China were described (Wen 1990a, Wang and Norton 1993b, Enami et al. 1994, Wang and Cui 1996a, Chen et al. 2010), but the collection material from different vegetation zones of the country revealed species-richness as that in the other parts of the Palaearctic and Oriental Region. This may be related to the dynamic history of the area, which had a different climate and biota found throughout China.

In the present paper, a new species *Epidamaeus conjungenus* sp. n. were described from Henan Provinces. In addition, a list and key to all known Chinese species were present.

Material and methods

Measurements and descriptions are based on specimens mounted in temporary cavity slides that were studied using a light microscope equipped with a drawing attachment. Body length is measured in lateral view, from the tip of the rostrum to the posterior edge of the ventral plate. Length of leg segments, including the portion inserted into the next segment, is measured in the lateral aspect. The number of specimens measured does not always equal the number of specimens examined because structures are sometimes indiscernible under the circumstances where the specimens are not slide-mounted.

Terminology generally developed by Grandjean (1960) as applied by Norton (1979). All type specimens and other material studied are kept in Oudemans' fluid and deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Taxonomy

Epidamaeus Bulanova-Zachvatkina, 1957

http://species-id.net/wiki/Epidamaeus

Type species: *Oribata bituberculata* Kulczynski, 1902 (Bulanova-Zachvatkina 1957a)

Diagnosis. Body reddish brown, medium sized, light to dark. propodolateral apophyses *P* mostly absent, but rarely present; the formation of tubercles of Prodorsum varied: usually only *Ba* or *Da* present, 3 pairs of tubercles (*Ba*, *Bp*, *Da*) is rare present as *Damaeus*; *La* tubercle can also be present, but weak and indistinct in dorsal view, and never in combination with *Ba* (as in *Kunstidamaeus*); *E*2a and *E*2b missing, *Va* and *Vp* rarely present occasionally. *SS* usually bristle-shaped, in shorter than ss (to 3/4 as long), bristle-shaped, mostly thin. Spinae adnata (*Sa*) usually present (subgen. *Epi-*

damaeus) or absent (subgen. *Akrodamaeus*); The length of legs medium to long; Tibiae I-IV without setae *d*; Setal mostly formula of genua I-IV: 4-4-3-3, rarely 4-4-4-4; Associated setal (setae *d*) formula of genua I-IV: 1-1-1-0; Setal formula of trochanters I-IV: l-1-2-1; Additional ventral seta *v*2" on I and IV missing. 6 g, 1 ag, 2 on, 3 ad. (Weigmann 2006)

Distribution. Palaearctic, Oriental, Nearctic, Neotropical and Australian regions.

Species of genus *Epidamaeus* from China

E. alticola Wang & Cui, 1996

Epidamaeus alticola Wang and Cui 1996a: 321; 1996b: 258.

Material examined. 5♂♂, 4♀♀, China, Qinghai Prov., Xining City, Huzhu National Geological Park(36°57'11"N, 102°28'55"E), from litter under Pteridophytes, 2384 m a.s.l., 23 August 2009, coll. Lixia Xie (GUGC)

Distribution. China (Qinghai).

E. cincinnatus Wang & Norton, 1993

E. cincinnatus Wang and Norton 1993b: 312; Wang et al. 2000: 323.

Material examined. 11♂♂, 6♀♀, China, Hebei Prov., Chengde City, Mt. Wuling (40°36'50"N, 117°28'57"E), from litter under birch, 1362m a.s.l., 25 August 2010, coll. Lixia Xie (GUGC)

Distribution. China (Beijing).

E. elegantis Wang & Norton, 1993

E. elegantis Wang and Norton 1993b: 316-318; Wang et al. 2000: 311.

Material examined. 6♂♂, 3♀♀, China, Fujian Prov., Wuyishan City, Mt. Wuyi (27°45'19"N, 118°02'56"E), from litter under the chestnut trees , 278m a.s.l., 4 August 2008, coll. Zehong Meng (GUGC)

Distribution. China (Fujian, jiangxi).

E. grandjeani Bulanova-Zachvatkina, 1957

E. grandjeani Bulanova-Zachvatkina 1957: 1794-1796; Wen 1990a: 119; Wang et al. 2000: 256.

Distribution. China (Jilin), Russia (Tatarstan).

E. longispinosus Wang & Norton, 1993

E. longispinosus Wang & Norton, 1993b, p. 314-316; Wang, Cui & Liu, 2000, p. 310–311.

Material examined. 4♂♂, 5♀♀, China, Fujian Prov., Wuyishan City, Mt. Wuyi (27°45'24"N, 118°02'46"E), from litter of coniferous forest, 263m a.s.l., 5 August 2008, coll. Zaihua Yang (GUGC)

Distribution. China (Fujian, Jiangxi).

***E. yunnanensis* Enami, Aoki & Hu, 1994**

E. yunnanensis Enami et al. 1994: 43–46; Aoki et al. 2000: 6.

Material examined. 2♂♂, 3♀♀, China, South of Guizhou Prov., Maolan National Nature Reserve (25°19'26"N, 107°55'59"E), from litter under Podocarpus, 819m a.s.l., 16 Sep. 2007, coll. Zaihua Yang (GUGC); 7♂♂, 6♀♀, China, Yunnan Prov., Dali City, Mt. Cang (25°38'38"N, 100°09'53"E), from litter under the pine, 1950m a.s.l., 18 December 2008, coll. Yi Yan (GUGC)

Distribution. China (Yunnan, Guizhou).

Key to species from China

1	Propodolateral apophysis (*P*) present, having tubercles (*La*) ..... ***E. yunnanensis* Enami, Aoki & Hu**
–	Propodolateral apophysis (*P*) absent, not having tubercles (*La*) **2**
2	Notogastral setae cincinal, genital seta g_6 far from g_5 ..... ***E. cincinnatus* Wang & Norton**
–	Notogastral setae not cincinal, genital setae normal for genus **3**
3	Sensillus (*ss*) aciculiform, aggenital seta (*ag*) lies between Anal aperture and genital aperture ..... ***E. elegantis* Wang & Norton**
–	Sensillus (*ss*) rod-like or flagellate, aggenital seta (*ag*) normal for genus..... **4**
4	Sensillus (*ss*) rod-like, seta c_1 longer than other notogastral setae ..... ***E. alticola* Wang & Cui**
–	Sensillus (*ss*) flagellate, seta c_1 not longer than other notogastral setae..... **5**
5	Notogastral setae leafy, Spinae adnatae rod-like ..... ***E. grandjeani* Bulanova-Zachvatkina**
–	Notogastral setae not leafy, Spinae adnatae not rod-like **6**
6	Coterminous ridge connected to the base of the notogastral setae; Spinae adnatae not long and spinous..... ***E. conjungenus* sp. n.**
–	Coterminous ridge not connected to the base of the notogastral setae; Spinae adnatae long and spinous..... ***E. longispinosus* Wang & Norton**

***Epidamaeus conjungenus* sp. n.**

urn:lsid:zoobank.org:act:7B87D6F6-BE4F-408C-8451-A0500B9F4A27

http://species-id.net/wiki/Epidamaeus_conjungenus

Fig. 1

Material examined. Holotype (female in Oudemans' fluid), China: Luoyang city, Mt. Baiyun (34°23'25.18"N, 111°01'23.15"E), Henan province, from litter, 2100 m a.s.l., 16 Aug. 2008, coll. Li-xia Xie. Paratypes. Five adults (2 males, 3 females), with same data as holotype.

Etymology. The specific name "*conjunctus*" is from Latin, and refers to the conjunct ridge.

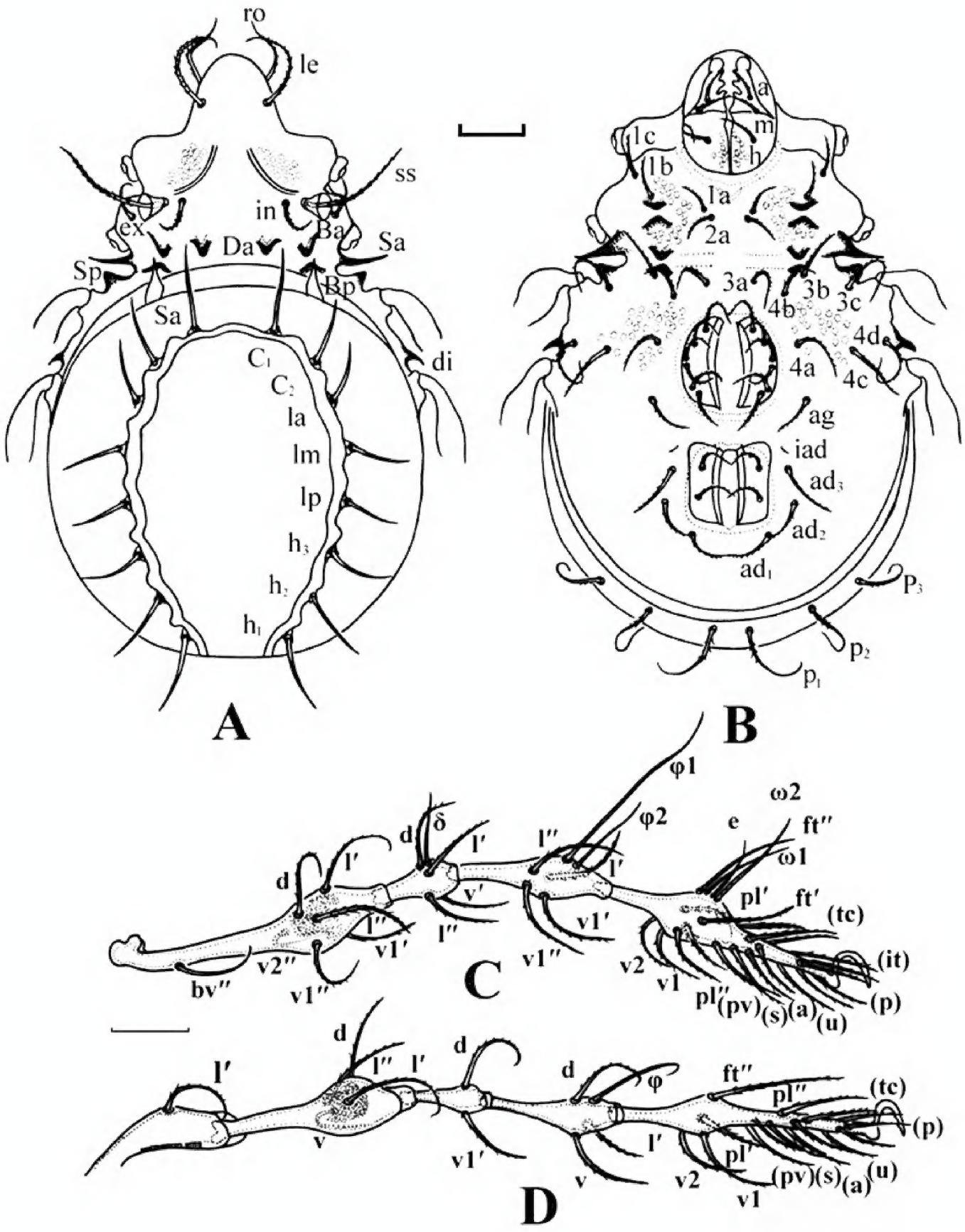

Figure 1. *Epidamaeus conjungenus* sp. n. **A** adult, dorsal view (100 μm) **B** adult, ventral view (100 μm) **C** leg I (100 μm) **D** leg IV (100 μm).

Diagnosis. Prodorsal tubercles *Da, Ba, Bp* present. Sensillus smooth, short, with conspicuous bars. *Sa* triangular, long and acuminate. *Sp* small, triangular. Enantiophysis *E2* and *V* present. *Vp* bearing seta *3b*. The setae of notogaster acuminate, radially directed. Leg setation as follows, femora 7-6-4-4; genua 4-4-3-2; tibiae 4-4-3-3; tarsi 21-18-18-15.

Dimensions. Body length 913 (holotype), 913- 932 (mean 924, 6 paratypes); body width 605 (holotype), 602- 623 (mean 610, 6 paratypes). Males slightly smaller than females: body length of males holotype and 2 paratypes) 886- 902 (mean 894), body width of males 584- 592 (mean 588); body length of females (4 paratypes) 906-914(mean 910), body width of females (4 paratypes) 596- 624 (mean 610).

Integument. Microtuberculate on all enantiophyses and apophyses, rostrum, lateral prodorsum and around leg acetabula. Cerotegument granules, thick, dense on most of body and legs, except digital part of tarsi. Notogaster with exuvial scalps, legs segments and lateral part of body with dense fungus micelles and adherent debris.

Prodorsum. Tubercles *Da* and *Bp* well developed, broadly rounded; *Ba* represented as high ridge. Propodolateral apophysis (*P*) absent. A ridge presents the side of prodorsum. Setae *ro* (175–183 μm) and *le* (216–221 μm) long, smooth, with conspicuous barbs; mutual distance of pairs *le* slightly less than that of *ro* (1.0:1.1). Interlamellar setae (96–104 μm), dark brown, with small barbs. Exobothridial setae (94–98 μm) smooth, relatively tenuous, attenuate. Sensillus (225–232 μm), with conspicuous barbs, undulating attenuate. Comparative length of prodorsal setae: *ex* < *in* < *ro* < *le* < *ss*.

Notogaster. Almost circular, slightly longer than wide. Anterior and posterior margins broadly rounded in dorsal view. Spinae adnatae large, directed anterolaterad in dorsal view, distance between their bases approximately equal to that between tubercles *Bp*. Notogastral setae of *c*-, *l*- and *h*- series inserted on distinct tubercles. Setae relatively smooth, brown, acuminate. Comparative length: $lm < lp < la = h_3 < h_2 < h_1 = c_1 = c_2$. The respective lengths: 88–94μm, 107–110 μm, 137–142 μm, 147–154 μm and 167–172 μm. Setae c_1, c_2 and *la* directed anterodorsad, other setae radially directed. A conjoint ridge connected to base of all notogastral setae. Mutual distance of setae c_2 twice that of c_1. Pseudanal setae undulating attenuate, the proximal half with obvious, thorn-like barbs, the distal half smooth. Comparative length: $ps_1 > ps_2 > ps_3$.

Ventral region. Epimere I with medial pit and associated groove. Enantiophyses E_2 and *V* well developed, broadly triangular in ventral view. Tubercle *Vp* bearing epimeral seta 3*b*. Parastigmatic tubercle *Sa* long, acuminate and triangular. *Sp* triangular, distinct in ventral view. Length of lateral aspect *Sp* twice as broad as *Sa*. Discidium acuminate, smaller than *Sp*, directed posterolaterad. Ventral setae faintly barbed. Setae 3*c*, 4*d* very long, flagelliform. Epimeral setation: 3-1-3-4. Anogenital region normal, seta ad_3 close to anal valves. Fissure *iad* minute, represented by small, inconspicuous pore in lateral corner of valve. Anal aperture appreciably equal to genital aperture.

Gnathosoma. Infracapitular mentum slightly wider than long, without noticeable microtubercles. Hypostomal setae *a*, *h* and *m* thin, slightly barbed; seta *a* relatively short. Chelicera rather strong, fixed and movable digits with three blunt teeth; setae *cha* and *chb* conspicuously barbed. Palpal setation: 0-2-1-3-8 including solenidion ω.

Legs. Relative lengths (I-IV): 1: 0.84: 0.95: 1.1. Leg IV 1.1 times ventral body length; Femur IV 1.44 times length of trochanter IV. Formulae of leg setation and solenidia: I (1-7- 4- 4- 21) [1-2-2], II (1-6-4-4-18) [1-1-2], III (2-4-3-3-18) [1-1-0], IV (1-4-3-3-15) [0-1-0]; Each solenidion on genu I - III coupled with a respective seta

d, seta *d* longer than solenidion on genu I-III. Solenidion φ_1 on tibia I flagelliform, and 2.2 times longer than φ_2.

Distribution. Known only from the type locality.

Table 1. Leg setation and solenidia of *Epidamaeus conjungenus* sp. n.

Legs	Trochanter	Femur	Genu	Tibia	Tarsus
I	*v*	*d*, *l'*, *l''*, v_1' v_1'' *bv''*, v_2''	*d*, *σ*, *l'*, (*v*)	φ_1, φ_2, *l'*, *l''*, (*v*)	*ft'*, *ft''*, *pl'*, *pl''*, (*v*), ω_1, ω_2, *ε*, (*pv*), (*tc*), (*it*), (*p*), (*u*), (*a*), *s*
II	*v*	*d*, *l'*, *l''*, *bv''*, (*v*)	*d*, *σ*, *l''*, (*v*)	*φ*, (*l*), (*v*)	*ft'*, *ft''*, (*v*), ω_1, ω_2, (*pv*), (*tc*), (*it*), (*p*), (*u*), (*a*), s
III	*l'*, *v'*	*d*, *l'*, *ev'*, *v'*	*d*, *σ*, *l'*, *v'*	*d*, *φ*, *l'*, *v'*	*ft*, *v'*, *pv''*, *pv'*, (*tc*), (*it*), (*p*), (*u*), (*a*), *s*
IV	*v*	*d*, *l'*, *ev'*, *v'*	*d*, *l'*, *v'*	*φ*, *l'*, (*v*)	*ft''*, (*v*), (*pv*), (*tc*), (*p*), (*u*), (*a*), *s*

Remarks. *Epidamaeus conjungenus* sp. n. can be readily distinguished from most of known species of *Epidamaeus* by the coterminous ridge connected to the base of the notogastral setae. Pseudanal setae undulating attenuate, the proximal half with obvious, thorn-like barbs, the distal half smooth. Parastigmatic tubercle *Sa* very long, acuminate, Discidium(*di*) acuminate. The strong Spinae adnatae (*Sa*). The Prodorsum of this new species is somewhat similar to *E. verrucatus* described by Enami and Fujikawa (1989), but the setae of notogaster of new species are smooth, and lack of Propodolateral apophysis (*P*) and present tubercles *Da* and *Bp*.

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